

IN THE CLAIMS

1. (Currently Amended) A method ~~for detecting outages~~, comprising:
capturing error codes associated with detected outages in a storage medium located in
a network processing device; and
automatically classifying the error codes into software caused outages and hardware
caused outages; and outage categories.

automatically classifying the software caused outages as:

planned outages that are user-directed and occur according to a predefined
outage schedule, the planned outages associated with scheduled maintenance;

first unplanned outages that are user-directed but occur independently of the
predefined outage schedule, the first unplanned outages corresponding to manually
initiated resets, manually initiated reloads and manually initiated processor-that are
manually initiated during unscheduled maintenance; and

second unplanned outages that occur independently of manually initiated
resets, manually initiated reloads and manually initiated processor-switchovers and
occur independently of the predefined outage schedule, the second unplanned outages
associated with device-disabling software errors.

2. (Currently Amended) The method according to claim 1 further including
automatically classifying a subset of the hardware caused outages as Online Insertion
Removal (OIR) outages that occur according to the predefined outage schedule. including
~~automatically classifying at least some of the outages as planned operational outages and~~
~~unplanned operational outages.~~

3. (Currently Amended) The method according to claim ~~[[2]]~~ 1 including ~~classifying~~
~~outages~~ classifying the software caused outages as planned operational outages planned
outages when a maintenance or planned upgrade command is detected and no error codes are
associated with the software caused outages.

4. (Currently Amended) The method according to claim 3 including classifying the
software caused outages as software, hardware, and first unplanned operational outages when
error codes and manually initiated commands are associated with the software caused
outages.

5. (Currently Amended) The method according to claim [[1]] 4 including:
classifying the error codes as a worst case software caused outages where the error codes could be associated with either hardware caused outages or software caused outages;
and

classifying the error codes as a best case software outage when the error codes could only be associated with software caused outages.

6. (Original) The method according to claim 1 including identifying the software caused outages and the hardware caused outages for multiple individual router processors in the network processing device.

7. (Original) The method according to claim 1 including computing an Accumulated Outage Time (AOT) and Number of Accumulated Failures (NAF) for the software caused outages and the hardware caused outages.

8. (Currently Amended) The method according to claim [[2]] 1 including identifying the software caused outages as second unplanned operational outages when a manual an unscheduled, non-user-directed reset command is associated with the software caused outages.

9. (Currently Amended) The method according to claim 1 including~~[[:]] capturing the error codes that are generated in association with the outages; and~~ storing the error codes in a local persistent memory.

10. (Currently Amended) A method ~~for measuring software outages~~, comprising:
monitoring outages in a network processing device;
identifying a monitored outage as a hardware caused outage when no crash information is stored, otherwise identifying a monitored outage as a possibly software caused outage;

monitoring manually initiated commands to the network processing device; and
classifying the possibly software caused outages as planned outages when the possibly software caused outages occur according to a predefined schedule;

classifying the possibly software caused outages as first unplanned operational outages when the possibly software caused outages occur according to the manually initiated commands;

classifying the possibly software caused outages as second unplanned outages when the possibly software caused outages occur independently of the predefined schedule and independently of the manually initiated commands; and

storing the classifications in a storage medium.

~~distinguishing manually initiated operational outages from other software outages and hardware outages according to the monitored manually initiated commands.~~

11. (Currently Amended) The method according to claim 10 including:
capturing error codes associated with at least some of the possibly software caused outages;

storing the error codes in persistent memory;

storing the manually initiated commands in persistent memory; and

automatically analyzing the stored error codes and manually initiated commands to distinguish first unplanned operational outages from second unplanned outages ~~planned operational software outages from unplanned operational outages.~~

12. (Currently Amended) The method according to claim 10 including capturing information associated with a mean time between failures or a number of accumulated failures for the monitored outages ~~manually initiated operational outages, software outages, and hardware outages.~~

13. (Currently Amended) The method according to claim 10 including:
identifying ~~the software and hardware outages~~ monitored outages associated with a first routing processor;

identifying ~~the software and hardware outages~~ monitored outages associated with a second backup routing processor; and

identifying ~~the software and hardware outages~~ monitored outages associated with a network processing device containing both the first routing processor and the second backup routing processor.

14. (Cancelled)

15. (Cancelled)

16. (Currently Amended) A network processing device, comprising:
a processor configured to capture error codes associated with network processing device outages and then automatically classify the error codes as software caused outages and hardware caused outages[.]; and

a first routing unit and a second back-up routing unit that each generate error codes individually classified by the processor as hardware caused outages and software caused outages.

17. (Original) The network processing device according to claim 16 wherein the processor is further configured to identify operational caused outages and then distinguish planned operational caused outages from unplanned operational caused outages.

18. (Currently Amended) ~~The network processing device according to claim 17 including~~ A network processing device, comprising:

a processor configured to capture error codes associated with network processing device outages and then automatically classify the error codes as software caused outages and hardware caused outages;

wherein the processor is further configured to identify operational caused outages and then distinguish planned operational caused outages from unplanned operational caused outages; and

a persistent memory for storing a crash file containing the error codes and Command Line Interface (CLI) commands, the processor identifying the hardware and software outages and the planned and unplanned operational caused outages according to the error codes and the CLI commands in the crash file.

19. (Original) The network processing device according to claim 18 wherein the processor is configured to identify outages that have no associated crash files as hardware outages, identify outages associated with reload or forced-switch-over CLI commands with no associated error codes as planned operational caused outages.

20. (Original) The network processing device according to claim 16 wherein the processor is further configured to classify software outages as worst case and best software caused outages according to the associated error codes.

21. (Cancelled)

22. (Currently Amended) A system for detecting outages, comprising:
means for capturing error codes associated with outages in a network processing device in a storage medium; [[and]]
means for automatically classifying the error codes into software caused outages and hardware caused outage categories[[.]]; and
means for classifying outages as software, hardware, and unplanned operational outages when error codes and manually initiated commands are associated with the outages.

23. (Original) A system according to claim 22 including means for automatically classifying at least some of the outages as planned operational outages and unplanned operational outages.

24. (Original) A system according to claim 23 including means for classifying outages as planned operational outages when a maintenance or planned upgrade command is detected and no error codes are associated with the outages.

25. (Cancelled)

26. (Original) A system according to claim 22 including:
means for classifying the error codes as a worst case software caused outages where the error codes could be associated with either hardware caused outages or software caused outages; and
means for classifying the error codes as a best case software outage when the error codes could only be associated with software caused outages.

27. (Original) A system according to claim 22 including means for identifying the software caused outages and the hardware caused outages for multiple individual router processors in the network processing device.

28. (Original) A system according to claim 22 including means for computing an Accumulated Outage Time (AOT) and Number of Accumulated Failures (NAF) for the software caused outages and the hardware caused outages.

29. (Original) A system according to claim 23 including means for identifying the outages as unplanned operational outages when a manual reset command is associated with the outages.

30. (Original) A system according to claim 22 including:
means for capturing the error codes that are generated in association with the outages;
and
means for storing the error codes in a local persistent memory.

31. (Currently Amended) Logic encoded in one or more computer readable medium for execution and when executed operable to A-computer-readable-medium for detecting outages, comprising:

capturing capture error codes associated with outages in a network processing device;
and

automatically classifying classify the error codes into software caused outages and hardware caused outage categories[[]]; and

classify outages as software, hardware, and unplanned operational outages when error codes and manually initiated commands are associated with the outages.

32. (Currently Amended) The logic of claim 31 further operable to A-computer readable-medium according to claim 31 including automatically classify ~~classifying~~ at least some of the outages as planned operational outages and unplanned operational outages.

33. (Currently Amended) The logic of claim 32 further operable to A-computer readable-medium according to claim 32 including classify ~~classifying~~ outages as planned operational outages when a maintenance or planned upgrade command is detected and no error codes are associated with the outages.

34. (Cancelled)

35. (Currently Amended) The logic of claim 31 further operable to A computer readable medium according to claim 31 including:

~~classifying~~ classify the error codes as a worst case software caused outages where the error codes could be associated with either hardware caused outages or software caused outages; and

~~classifying~~ classify the error codes as a best case software outage when the error codes could only be associated with software caused outages.

36. (Currently Amended) The logic of claim 31 further operable to identify A computer readable medium according to claim 31 including identifying the software caused outages and the hardware caused outages for multiple individual router processors in the network processing device.

37. (Currently Amended) The logic of claim 31 further operable to compute A computer readable medium according to claim 31 including computing an Accumulated Outage Time (AOT) and Number of Accumulated Failures (NAF) for the software caused outages and the hardware caused outages.

38. (Currently Amended) The logic of claim 32 further operable to identify A computer readable medium according to claim 32 including identifying the outages as unplanned operational outages when a manual reset command is associated with the outages.

39. (Currently Amended) The logic of claim 31 further operable to A computer readable medium according to claim 31 including:

~~capturing~~ capture the error codes that are generated in association with the outages; and

~~storing~~ store the error codes in a local persistent memory.

40. (New) The method according to claim 11 including classifying the error codes that are possibly hardware caused outages as hardware outages and identifying the error codes that are possibly software caused outages as software outages.

41. (New) The method according to claim 14 including identifying the error codes that are possibly hardware or software caused outages as worse case software outages and identifying the error codes that are only software caused outages as best case software outages.

42. (New) The network processing device of claim 16 wherein the processors are further operable to:

- compute a software Mean Time Between Failure (MTBF) range using the best and worst case software caused outage classifications; and
- send the software MTBF range to the NMS.

43. (New) A network processing device, comprising:

- one or more processors; and
- a memory coupled to the processors comprising instructions executable by the processors, the processors operable when executing the instructions to:
 - capture error codes associated with network processing device outages;
 - classify the error codes as hardware caused outages when the error codes could only be caused by a hardware crash;
 - classify the error codes as best case software caused outages when the error codes could only be caused by a software crash;
 - classify the error codes as worst case software caused outages when the error codes are ambiguous; and
 - send the classifications over a packet switched network for further processing at a remote Network Management System (NMS).

44. (New) The network processing device of claim 43 wherein the processors are further operable to:

- compute a software Mean Time Between Failure (MTBF) range using the best and worst case software caused outage classifications; and
- send the software MTBF range to the NMS.